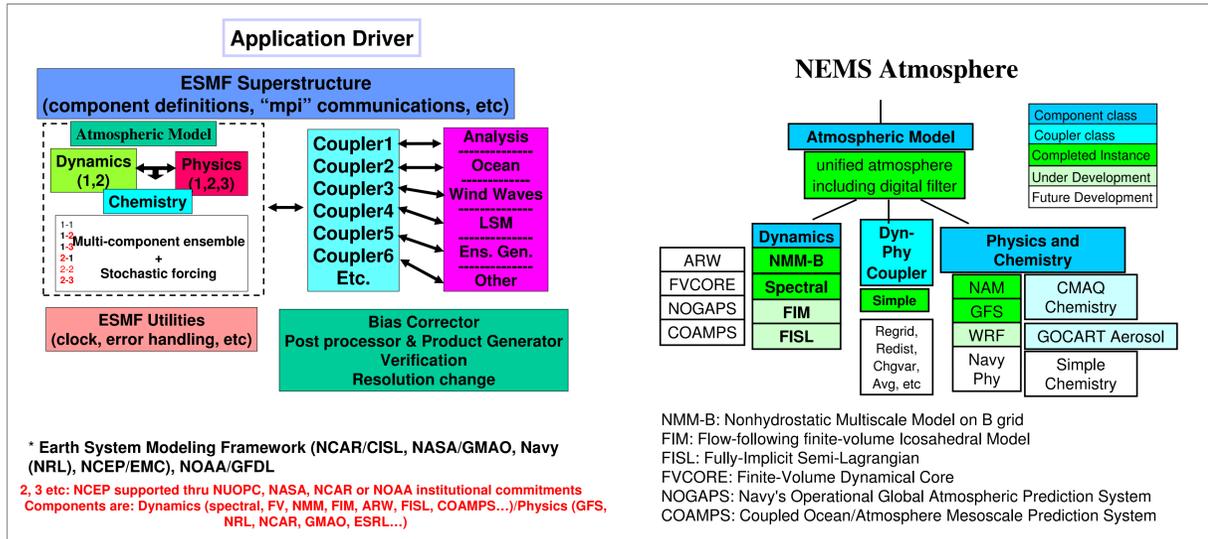


Recent Status of NEMS/NMMB-AQ Development

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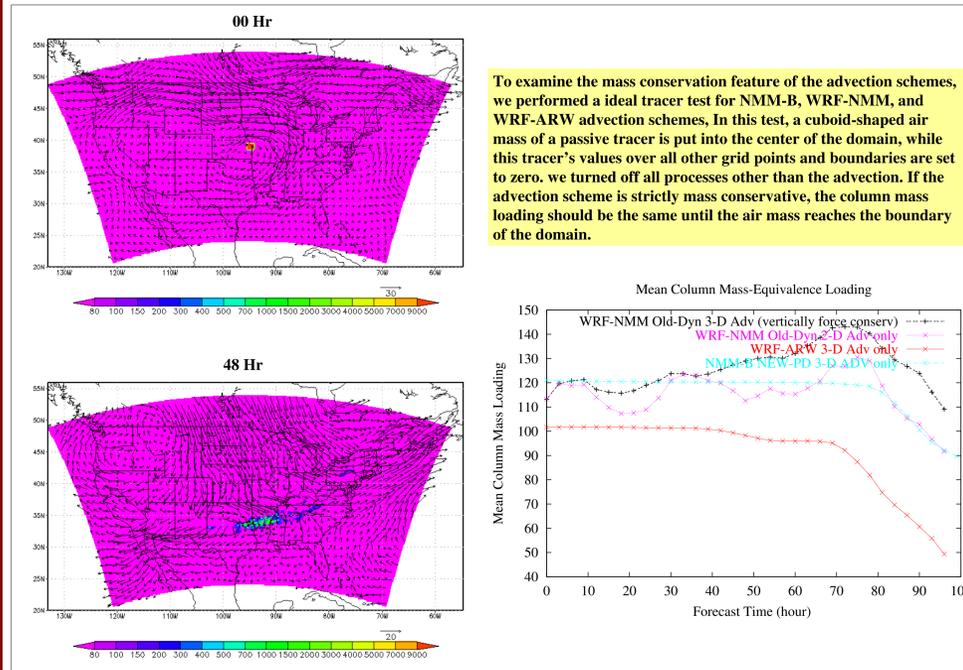
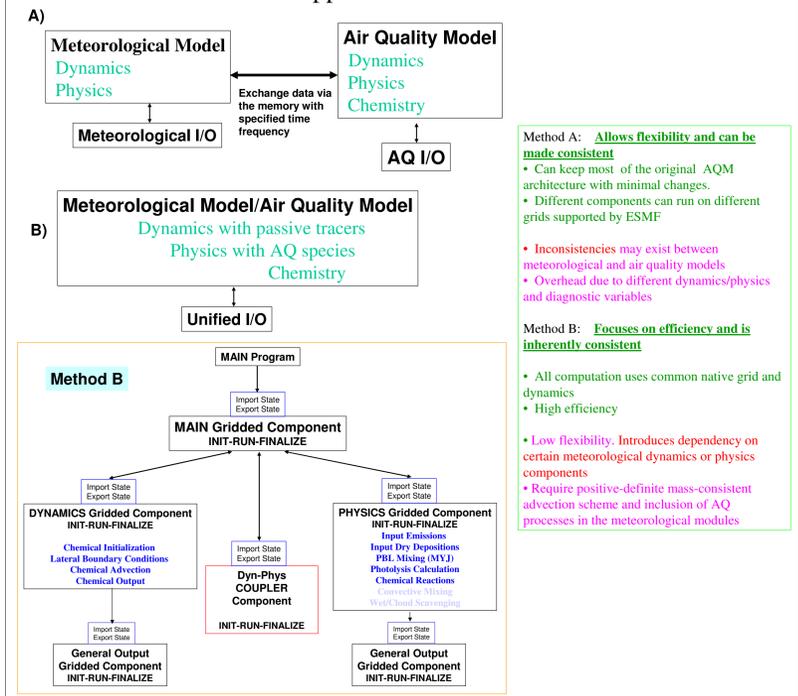


Summary and Future plan

The development of NEMS/NMMB inline air quality model has started using ESMF framework. Most of related chemical/physical modules are zero-dimensional or one dimensional, which can be placed into this system directly, either as normal subroutines or as an ESMF gridded component. We will use CMAQ existing chemical modules in this system. The new mass-conservative NMM-B advection scheme can support air quality applications, and the corresponding meteorological prediction is under testing now.

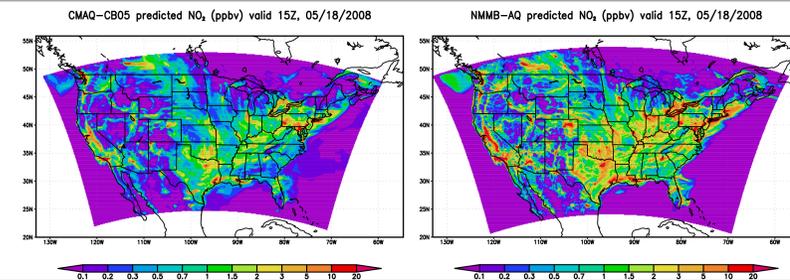
In next step, we will add and test convective mixing for passive tracers, in-cloud/under-cloud chemical scavenging, replace interpolated emissions with native-grid emissions (CMAQ SMOKE package), and put biogenic emission and dry deposition inline. Alternative more flexible coupling approach through a separate chemistry grid component (method A) will be explored.

Two Inline Approach



	CMAQ	WRF-CHEM	NMMB-AQ
Model Framework	CMAQ	WRF	NEMS/ESMF
Input Meteorology	Offline, recalculate some variables, like w and PBL heights	Inline	Inline
Input frequency	hourly	Every advection time Step	Every advection time Step
Advection scheme	piecewise parabolic method	WRF-ARW, WRF-NMM	NMM-B
PBL Mixing	ACM2 (derived from input meteorology)	Kz (calculated from YSU, MYJ etc)	Inline MYJ
Convective Mixing	ACM (derived)	Grell (derived)	BMJ adjustment or Grell (derived)
Gaseous Mechanism	CB04, CB05, SAPRC	RADM2, CBMZ, CB05, RACM	CB05
Photolysis	Look-up-table, Simplified TUV	Fast-J, Fast-TUV	TUV, Fast-TUV

We made a test run using emissions and dry deposition velocities interpolated from operational CMAQ.



NMMB Dry Run ONLY without convective mixing or wet scavenging